UNIVERSITY OF GONDAR

FACULITY OF VETERINARY MEDICINE

DEPARTMENT OF ANIMAL PRODUCTION AND EXTENSION

ASSESSMENT OF SEXES OF THE PROGENY PRODUCTION IN THE CASE OF ARTIFICIAL INSEMINATION OF DAIRY COWS IN AND AROUND UNIVERSITY OF GONDAR

SENIOR RESEARCH PROJECT REPORT

BY

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AND

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MAY 2015

ETHIOPIA, GONDAR

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SENIOR RESEARCH PROJECT REPORT SUBMITTED TO DEPARTMENT OF ANIMAL PRODUCTION AND EXTENSION, IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS FOR BACHELOR OF SCIENCE DEGREE IN ANIMAL PRODUCTION AND EXTENSION

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DEDICATION

This thesis is dedicated to our late father's, Ato Lemesa Buli and Robe Barako due to whose proper guidance & effort in our school inspired a great interest of learning in our mind & to our mother's, W/ro Workine Tedesa and W/ro Danbali Wako who provide them all her love & sacrificed her interests in our life of success next to almighty GOD. ***Your early advice & encouragement have made me a man.***

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LISTS OF ABBREVIATIONS

AD	Anno Domini
AI	Artificial Insemination
AITs	Artificial Insemination Technicians
AV	Artificial Vagina
CSA	Central Statistics Agency
E	East
EASE	Enhanced Acoustic Simulator for Engineers
Ha	hectares
HH	household
Km	Kilometer
LSD	Lumpy Skin Disease
M	meter
Mm	millimeter
MoA	Ministry of Agriculture
N	North
Oc	Degree Celsius
SAS	Statistical Analysis System
UOG	University of Gondar

ACKNOWLEDGEMENTS

Above all, We would like thanks the almighty, omnipotent, God, for giving us the opportunity for this undergraduate study and for giving us health, energy, and favorable situations to carry out the research work. We have special honor and we are very grateful/indebted to our academic advisor Mr. Addis Getu for his professional intellectual advice, material support, encouragement, suggestion, guidance during the study period and devotion of time in correcting this paper from the beginning up to the end.

We would like to appreciate the supports given to us by the Faculty of Veterinary Medicine and UOG. Their encouragement and all-rounded supports to perform this big work in the One-year research period are highly appreciable. I am very much indebted to all those who genuinely and affably devoted their times to Contribute to the research by participating in focus group discussions, questionnaire filling, related programs, very much questionnaire filling, and openly response to our ideas.

Finally, no words of thanks to express our deepest gratitude and respect to our affection parents for their financial support, being with us throughout our life, for their moral and encouragement in our life.

ABSTRACT

An exploratory field survey and semi structured questionnaire was used to assess the sex's distribution of the produced progeny as a result of AI in and around three Keble's of UOG (Keble, namely Keble 10, 14, and Keble 18) from March 2015 to May 2015 was conducted. In addition to sex distribution the study was focused on the efficiency, effective, constraints/problems, performance, advantages and disadvantages of AI services. In this study from the total animal (cattle) population about 30 on farm cattle producers was selected using random selection methods. Statistically non significant differences ($P \geq 0.05$) was observed in the distribution of the produced offspring in all sampling sites. Whereas, about 66% and 44% of the respondents were satisfied and non-satisfied in case of artificial insemination services, based on the respondents response respectively. The total percentage of produced male and female calves in the study areas was covering about 50% and 50%, respectively. The questionnaire surveys indicated that AI has many advantages and as well as has many challenges and so is not doing well in the selected study area. So, major constraints stated by interviewers were repetitive insemination, disease, feed, lack of land, and lack of AITs with the proportion of 33.34%, 20%, 10%, 10% and 26.66% in that order. Therefore, AI services are required immediate response to changes the situation before collapsed totally and to achieve a success and the influential bodies must create awareness for users about the equal probabilities of sex distribution of progenies in case of AI.

***Key words**:* Artificial Insemination, North Gondar, Sex dynamics.

1. INTRODUCTION

1.1 Background Information

Artificial insemination is defined as a process by which sperm is collected from the male and processed, stored and artificially introduced into the female reproductive tract for the purpose of conception (Morrow et al., 1985; Roberts; 1985; Webb; 2003). The same source stated that AI is practiced during in 1938 in Asmara, Ethiopia which was interrupted due to the Second World War and restarted in 1952 to improve the performance of local cattle breeds in Ethiopia (Yemane, *et al*., 1993). In Ethiopia about 52 million heads cattle population was estimated of which 0.1% pure exotic and 0.5% are hybrid type (CSA, 2012). Still this large cattle population is found in traditional production system, there is no proper provision of supplementary feed, facilitated house and other managemental aspects.

In spite of the presence of large and diverse animal genetic resources, the productivity (i.e. meat and milk) of livestock remains low in many developing countries including Ethiopia for various reasons such as inadequate nutrition, poor genetic potential, inadequate animal health services, and other management related problems (Lobago, 2007). Cattle breeding are mostly uncontrolled in Ethiopia making genetic improvement difficult and an appropriate bull selection criteria have not yet been applied and controlled (Tegegn *et al*. 1995). Although artificial insemination is the most commonly used and valuable biotechnology to improve the performances of local animal genetic resources (Webb, 2003) and it has been operating in Ethiopia for the last 30 years ago even if the efficiency and the impacts of the operation has not been well-documented (Himanen and Tegegn, 2003).

Reproductive problems related to crossbreed dairy cows under farmers' conditions are immense (Bekele, 2005). It is widely believed that the AI service in the country has not been successful to improve reproductive performance of dairy industry (Sinishaw, 2004). From the previous little study, AI service is weak and even declining due to inconsistent service in the smallholder livestock production systems of the Ethiopian highlands (Dekeba *et al*., 2006).

The problem is more aggravated by wrong selection and management of AI bulls along with poor motivations and skills of inseminators (GebreMedhin, 2005). Therefore, the objective of the research was to assess and identify effectives and constraints associated with the artificial insemination service in Gondar and to forward workable recommendations for decision makers and stakeholders.

1.2 Statement of the Problem

So many researchers are conducted different reports from different parts of Ethiopia about the efficiency and other related aspect of AI. However, the above authors are area specific and not included the overall situations of AI in and around UOG. Therefore, comprehensive study about AI in and around was mandatory. From the above problems we are interested to conduct research on this title to meet the following objectives.

1.2 General Objective

Assessment of sex dynamics of their progenies obtained from artificial inseminations.

1.2.1 Specific objective

1. To assess and identify efficiency & effectiveness of artificial inseminations.
2. To identify the constraints that associated with AI service.
3. To forward recommendations for decision makers and stakeholders in case of owners to use AI service for a better improvement of livestock production

2. LITERATURE REVIEW

2.1. Cattle Production in Ethiopia

Ethiopia has an estimated cattle population of about 41.5 million heads (EASE, 2003).Around 99.45 are indigenous breeds with very few hybrids, 0.5%, and exotic 0.1%. Cattle production together with the production of other livestock sectors has been known to be an important component of the agricultural sector. Livestock contributes much by providing meat, milk, cheese, butter, export commodities (live animals, hides and skins), draught power, manure, near-cash capital stock (EASE, 2003). It is known that no enough selection and improvement for productivity has been performed on the indigenous cattle. Nevertheless, the indigenous cattle are known to have special merit of coping with the harsh environments of the country. On the other hand, the high performing exotic cattle cannot cope with the harsh environments of the country (MoA, 2003). Therefore, improvement on the indigenous cattle for productivity without losing traits, which are essential for survival, has been proposed (MoA, 2003).

2.2 Artificial Insemination

Semen**:** is the fluid containing sperm that is produced by males. Whereas Sperm**:** is the mixture of semen or a spermatozoon (Webb, 2005).Artificial insemination (AI) has been defined as a process by which sperm is collected from the male, processed, stored, and artificially introduced into the female reproductive tract for the purpose of conception (Morrow et al., 2005; Roberts, 2005; Webb, 2003). Semen is collected from the bull, deep-frozen and stored in a container with Liquid Nitrogen at a temperature of minus 196 degrees Centigrade and made for use. Artificial insemination has become one of the most important techniques ever devised for the genetic improvement of farm animals.

It has been widely used for breeding dairy cattle as the most valuable management practice available to the cattle producer and has made bulls of high genetic merit available to all (Webb, 2003; Bearden et al., 2004). In livestock rearing, the producer makes efficient use of the generous supply of sperm available from an individual male in a manner that greatly increases genetic progress, as well as improving reproductive efficiency in many situations. Today, many bulls have been reported to produce sufficient semen to provide enough sperm for 40,000 breeding units in one year (Bearden *et al.,* 2004).

The use of AI in Ethiopia is growing but estrus detection is difficult owing to poorly expressed estrus of Zebu breeds (Bekele *et al.*, 1991) have shown that the short duration and low intensity of estrus signs in Ethiopian Zebu cattle caused most estrus detection failures which indicates a need for the use of current advances in AI such estrus synchronization.

2.2.1 History of artificial insemination

The first successful AI was performed in Italy in 1780 and over 100 years later, in 1890, it was used for horse breeding (Webb, 2003). In Russia, however, the method was first taken up seriously as a means of improving farm animals (Heinonen, 1999). According to Webb (2003), the history of AI is interesting in that old Arabian documents dated around 1322 A.D. indicate that an Arab chieftain wanted to mate his prize mare to an outstanding stallion owned by an enemy. He introduced a wand of cotton into the mare's reproductive tract, and then used it to sexually excite the stallion causing him to ejaculate. The semen was introduced into the mare resulting in conception. The author further indicated that Anthony Van Leeuwenhoek, inventor of the microscope, first observed human spermatozoa under magnification, which led to further research. In fact, Spallanzani has been recognized as the inventor of AI. His scientific reports of 1780 have indicated successful use of AI in dogs. In 1899, Ivan off of Russia pioneered AI research in birds, horses, cattle and sheep, and was apparently the first to successfully inseminate cattle artificially (Webb, 2003). Mass breeding of cows via AI was first accomplished in Russia where 19,800 cows were bred in 1931 Webb (2003). Denmark was the first European country to establish an AI cooperative association in 1936. E.J. Perry of New Jersey visited the AI facilities

In Denmark and established the first United States AI cooperative in 1938 at the New Jersey State College of Agriculture. The first artificial vagina (AV) was reportedly devised by G. Amantea, which was used to collect semen from the dog (Sorensen, 2002). In the years that followed, numerous Russian researchers developed artificial vagina for the bull, stallion, and ram.

The method of semen collection using artificial vagina has been reported to be closest to the natural conditions and is assumed to yield the most normal ejaculate of all methods used. An

attempt has been made to simulate the normal or best temperature, pressure, lubrication, and position to obtain the optimum response of the male (Sorensen, 2002). The AV consists of an outer rigid or semi-rigid support with an inner jacket containing controlled-temperature water and pressure and collecting funnel and container. In Ethiopia, AI was introduced in 1938 in Asmara, the then part of Ethiopia, which was interrupted due to the Second World War and restarted in 1952 (Yemane et al., 1993). It was again discontinued due to unaffordable expenses of importing semen, liquid nitrogen and other related inputs requirement.

In 1967 an independent service was started in the then Arsi Region, Chilalo Awraja under the Swedish International Development Agency (Sida). Zewdie et al. (2006) has described that the technology of AI for cattle has been introduced at the farm level in the country over 35 years ago as a tool for genetic improvement. The efficiency of the service in the country, however, has remained at a very low level due to infrastructure, managerial, and financial constraints and also due to poor heat detection, improper timing of insemination and embryonic death.

In Ethiopia, there is often complaint of the AI service, by service users for imbalance female and male ratios of calves born in which the latter exceeds in percentage, which is against the interests of most of the beneficiaries (Bekele, 2005). Breeding using AI or natural mating affected male: female calf ratio, which gives sense and can be applicable if the system works. However, the reason why natural mating gave more female progenies than males for cows.

2.2.2 Factors affecting success of artificial insemination

The site of semen deposition has been an important factor in the success of AI in cattle. In addition, the deposition of semen in the uterine body resulted in a 10% higher non-return rate than did cervical deposition (Macpherson, 2001). An increase in the conception rate has been reported when semen was deposited in the uterine horns rather than the uterine body (Senger *et al*. (1999). In contrast, no difference was found in the fertilization rate, conception rate or non return rate, respectively, between uterine body and uterine horn inseminations (Hawk and Tanabe, 2009; Williams *et al*., 2002; and McKenna *et al.*, 2003). In super ovulated cows, Hawk et al. (2005) used a modified insemination device requiring two technicians to deposit semen near the uterotubal junction and as compared to uterine body deposition; he found no effect upon the fertilization rate.

The major factors that determine AI efficiency are heat detection skills, fertility level of the herd, semen quality, and efficiency of inseminators (Barrett, 2003). Similarly, a successful insemination requires the acquisition of quality semen from a bull, the detection of estrus in the female, and the ability to properly place the semen in the reproductive tract of the female (Damron, 2000).

Detection of estrus has been known to be one of the most difficult tasks for successful AI activities, which in turn is affected by diseases of testis, epididymis, and accessory glands in the male (Sori, 2004) and diseases of the female reproductive tract (Roberts,1999). The success of AI depends upon various factors such as the efficiency, capacity and commitment of AI centers in procedurally and ethically producing, processing, handling and distributing semen; the commitments and efficiencies of AITs; presence of appropriate breeding policy along with proper control of indiscriminate crossbreeding; proper heat detections by farmers and other factors (GebreMedhin, 2005)

2.2.3 **Advantages and disadvantages of artificial insemination**

Maximum use of superior sires has been considered as the greatest advantage of AI while natural service has been linked to limit the use of one bull, probably, to less than 100 mating per year (Webb, 2003). The author further showed that AI usage enabled one dairy sire to provide semen for more than 60,000 services in one year, prevention of reproductive diseases, control of inbreeding, minimizing the cost of keeping bulls for natural service and others, besides, the availability of accurate breeding dates, pregnancy rates, inter-estrus intervals, and days to first service used to monitor fertility are other advantages of AI (Sinishaw, 2004),

It provides greater opportunities for genetic improvements via the use of proved genetically superior bulls at reasonable cost; it makes more widespread use of genetically superior bulls by making more efficient use of their semen. In natural mating services a bull may services 50 to 100 cows per year. In AI it's not unusual for a bull to services 10,000 to 20,000 cows per year.

It eliminates the danger involved in keeping a herd sizes, It offers dairy men a wider selection of bulls, thus avoiding the danger of "putting all his eggs in one basket". It is also makes it easier to

avoid inbreeding, It reduces the risk of acquiring & spreading infectious reproductive diseases, there is less chances of using poor semen and eliminating problems of mating large' bulls to small heifers & small bulls to large cows. However, poor conception rates due to poor heat detection and inefficiency of AI technicians, dissemination of reproductive diseases, Poor fertility rates if AI centers are not equipped with appropriate inputs & are not well managed, high cost of production (collection and processing), storage and transport of semen (Pope, 2000), as well as budget and administrative problems and inefficiency of AITs, a skillful, conscientious techniques is required or more laborious and Fewer bulls are needed; consequently, the sale of bulls from purebred herds is reduced.

3. MATERIALS AND METHODS

3.1 Description of the Study Area

The study was conducted in north Gondar zone north western part of Ethiopia which is located at 738km from Addis Ababa. The area is found at altitude, longitude, & latitude of 2200m, 35.3-35.7^{0}E, & 12.3-130N respectively. Gondar town has 12 urban kebeles and 11 rural kebeles and on averages the sun shines 8 hours a day. Total area of the administration is 34418.8ha. In that 4700ha is urban and 29718.8ha is rural area of land coverage (source: CSA 2006). The overall dairy cows, bulls, male calves, female calves and heifers were 1368, 84, 191, 368, and 228**,** respectively.

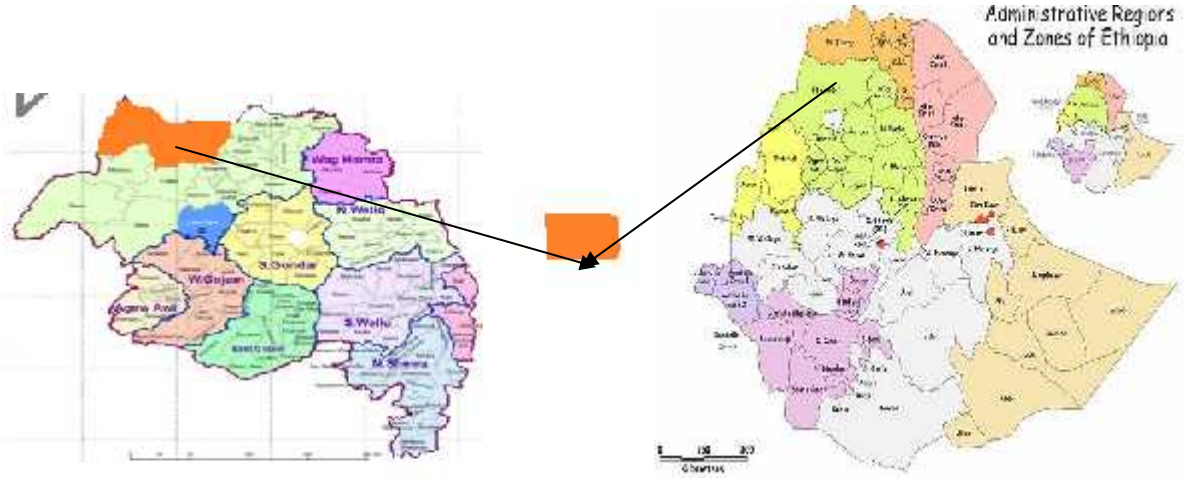

Figure 3. 1. Map of study area in Amhara region indicated by arrow in which the selected Keble were found, of Ethiopia.

The study was conducted on the assessment of progeny production as a result of AI of dairy cows includes Keble 10, 14 and 18 of Gondar town, North Gondar Administrative Zone. The weather condition of the area is semiarid climate having an annual minimum & maximum temperature, humidity & mean rainfall varying 12.3 & 30 ^{0}C, 53% & 1000mm respectively.

The study has been carried out in university of Gondar dairy farms and around Gondar especially Keble 10, Keble 14, and Keble 18 which is located in Gondar, Ethiopia with total land coverage of 142km square and 180km from Bahir Dar (Webb 2011-14). Similarly the same source showed that the zone is bordered by Debub Gondar Zone in the south, Lake Tana in the southwest, Debya in the west, Lay Armacheho in the north, Wegera in the northeast and Mirab Belessa in the southeast. The humane population of the area is 259,594, males are 124215 and females are 155379 and the livestock population have estimated to be 8.503388 million of cattle.(source: CSA, 2006). The area is characterized by two season, the wet season from June to September and dry season from October to May (CSA, 2003). The total of 1368 dairy cows is selected and inseminating for improve cattle breed and increasing milk yield.

3.2 Study animal

A total of cattle are 2239 in these bulls, dairy cows, heifers, calves and male calves are 84, 1368, 228, 368 and 191 respectively. The cows were managed under intensive, extensive and semi-intensive management system.

3.3. Study design

An exploratory field survey was used most for on-farm study. In the on-farm trial 30 farmers with inseminating cows and willing to participate in the study were selected. Those 1368 inseminating cows and 228 heifers were synchronized by symptoms of heat for the fertility of eggs to produce progenies. Questionnaire was administered to owners for identifying the assessing and constraints of AI service.

3.4 Sampling Methods

The sample was taken by non-probability sampling techniques for the selection of Kebles. Whereas, systematic simple random sampling techniques was used to select respondents for the primary data.

3.5 Questionnaire Methods

Data on the causes, risk factors and managemental techniques taken for improve the assessment of sexes of progeny production by using of AI services of dairy cows which collected using questionnaire. The questionnaire was closed ended through personal interviews. Interviews were carried out with the owners or the personnel responsible for the dairy cows and AITs. Breed of cows, sex of calves, season of AI service successful and failure, constraints of AI, and their farming systems were included to obtain the information of individual animals. The data was collected by visiting 30 farms that found in three Keble in Gondar town.

These farms could be smallholding farms having 2 to 10 cows and farms having large number of cows up to 11 and above dairy cows. First exploratory field survey were consider before the main data collection work were conducted to know the overall situation of the study area. Accordingly three kebeles (Keble 10, 14 & 18) and the dairy farm were selected. Following that a total of 30 respondents, 10 per Kebles were selected using systematic simple random sampling techniques.

3.6 Data Sources

Both primary and secondary data were considered. Primary data an information that got from the owners of the cattle that include the major constraints, available feed resources, sex distributions of the progenies and a socioeconomic characteristic of the respondents and personal observations. Whereas secondary data include different information obtained from internet, around Gondar Keble agricultural offices and from different books.

3.7 Data Type and Collection Techniques

Quantitative data include number of family size, land size, numbers of cattle, and number of borne calves. Whereas qualitative data include constraints, sex of the respondents, feed type, production system.

4. RESULTS

4.1 Socio-Economic Characteristics of the Respondents

About 86% of the interviewed farmers were males and 14% were females of the respondents were fully involved in farming activities as means of livelihood. The majority of the respondents 60% were single and 40% were married and the largest proportion 65% of the respondents was within the age group of 25-41 years. About 3.3% of the respondents were Muslim whereas, the remaining 96.70% Orthodox Christian. About 33% of the interviewed farmers were illiterate while 67% can read and write.

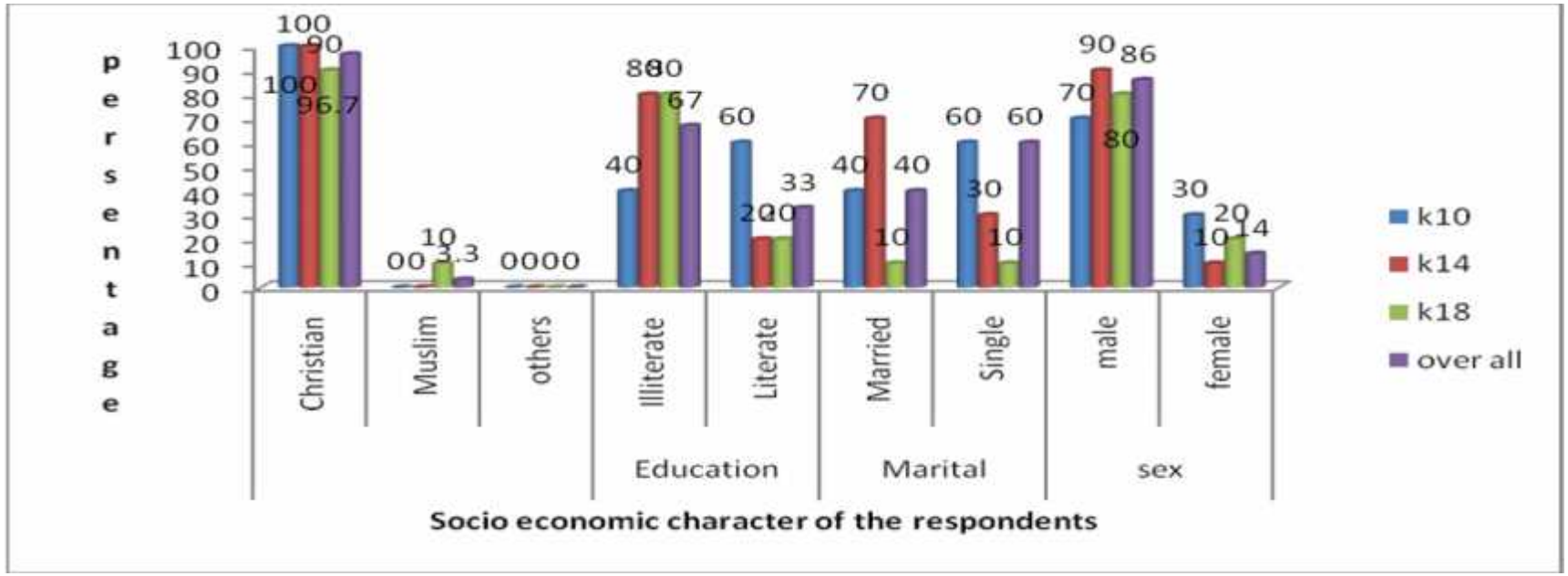

Figure 4.1 Socio-Economic Characteristics of the Respondents

4. 2 Herd size and structure

The total number of dairy cattle in the study area was 1368 ranging from 9 to 100. There were a consistent higher proportion of dairy cattle in the herd size in the studies conducted in Keble 10. The relatively large proportion of cattle per HH in the study area might purposively do by the farmers' to increase milk yield and securing the sources of replacement herds. It might as well be attributed to lack of detection methods and culling against the dairy cattle.

Table 4.1Quantitative traits (Mean ± SD) of cattle population and Herd size and structure/hh

Respondents (n)	Variable	PA/ Mean ± SD			Over All Mean
		1	2	3	
	Bull	(3±2)[a]	(3±2)[a]	(3±2)[a]	3±2
	Cows	(45±29)[a]	(27±13)[b]	(26±10)[b]	32.67±17.33
	Heifer	(8±4)[b]	(8±3)[b]	(11±4)[a]	9±3.67
	Female calves	(13±5)[a]	(12±4)[a]	(14±6)[a]	13±5
	Male calves	(6±3)b	(5±3)[b]	(9±2)[a]	6.67±2.67
30					

Where, PA=Peasant Association, HH=Household, SD=Standard Deviation.

4.3 The major constraints of the study area

Respondents were allowing ranking their 1st, 2nd etc constraints. So most interviewers were locally known, community leaders, influential and story tellers. According to the owners repetitive insemination was the first ranked problem followed by lack of AITs with the index value. There are many problems that faced the owners of cattle and AITs in that study areas. This must affect the production and the productivity of the cattle. And also there are many constraints, but this is the major of the problems that gathered by questionnaire survey and personal interviews.

Table 4.2 the major problems of the respondents (30 respondents)

Constraints	Weighted value	Rank
Repetitive insemination	0.3	1
Disease	0.25	2
Feed	0.1	3
Lack of land	0.1	3
Lack of AITs	0.25	2

The major problems of the AITs are unavailability of nitrogen gas or liquid nitrogen gas. Because of this reason many sectors and the user of AI are stopped to use AI services and also it is much cost, i.e. 35L liquid nitrogen is around 700 birr which survives up to 45 days. In addition to the information generating from dairy owners a very few Artificial Insemination Technicians were forwarding some important major problems. Therefore, about half of the Artificial Insemination Technicians have been stated that unavailability of nitrogen gas was the main constraints in the study area. The result obtained from the current study was in lined with **(**Desalegn, 2008**)** who reported that unavailability of nitrogen gas was the problems of animal production from south western part of Ethiopia.

Table 4.3: The major problems of Artificial Insemination Technicians (6 in numbers)

Major problems	Percentage (%)
Unavailability of semen	16.67
Unavailability of nitrogen gas	50.01
Farmers do not know the advantages of AI	16.67
Lack of material	16.67

4.4 The effectiveness and efficiency of artificial insemination

The one main advantage of the AI services in the study area was used to increase the milk yield potential. Examplically, if one breed of exotic cattle with the potential of 24l/day milk yield crossed with the local cattle of 10l/day of milk yield, the born offspring can give 17l/day milk yield. The satisfied of AI in Keble 10, 14, and 18 were 20%, 26%, and 20% were as not satisfied of AI in those kebeles are 15%, 16%, and 13% respectively.

5. DISCUSSION

The study was conducted on assessment of sexes of progeny production in UOG and its surrounding to determine the progeny production, advantages, disadvantages, and constraints of AI services. The results discovered on overall inseminating of 66% are satisfied in AI services and 44% were not satisfied in AI services in the study area. The objective of the present study was to determine if AI in dairy cattle increased the probability of a male calf than female calf compared to natural mating. To our knowledge no other study has compared both mating types. The results from this study clearly indicate that using AI was increase the probability of male calves and the female calves are generally equal. But, there are culturally believes from the farmers/owners of the dairy cattle that said AI services can increase or produces more male calf than female calf, other than this believable assumption was not prove within an evident. So the chance or probability of progeny production are equally, i.e. they have 50:50 probability. This is an important factor and should also be accounted for in the economic comparison of natural mating and AI.

Additionally, several other factors such as time of the year at birth (or associated parameters such as time of conception), sex of the dam's previous calf, sire breed and parity of the dam also significantly affected secondary sex ratio. The secondary sex ratio of 50% males observed in the present study disagrees with most previous international studies in dairy cattle which documented a higher incidence of males than females (Berry *et. al,* 2006).

There is no obvious reason for the significant effect of year on sex ratio. Parity number and calving pattern remained relatively constant over the 4 years of the study. Although the proportion of calves recorded with beef sires increased with time, which will increase the probability of a male calf, the level of AI decreased with time which will decrease the probability of a male calf. One contributing factor to the annual effect on sex ratio may be climate and its associated effects on sex ratio (Berger *et. al,* 2005)

Generally, factors considered in the present study area where found to be statistically significant ($P \geq 0.05$) and considered to be associated with prevalence of AI services in the case of progeny production. So it is necessary to aware the relevant bodies that the existence of these factors play role in increasing the burdens of repetitive of insemination in the study area.

The outcomes of the assessment of the AI result in progeny production indicated that the presence of major constraints which associated with AI services in the study area, like: repetitive insemination, lack of AIT, disease, feed, lack of lands, and the minor problems faced in that study area are like: mastitis, Bovine tuberculosis, inbreeding problems, insight of eyes, dwarfism, shapeless body condition, LSD, Brucellosis, Bloating, foot root, distocia, viral disease, lack of vaccines coverage are most and crucial challenges that faced the owners and technicians in field study of area in relation to AI services.

The very high repeat breeding condition the study area is believed to be serious problem. High numbers repeat breeders are the result of problems associated with poor semen, poor semen handling practices, inefficiency of nitrogen gas and poor insemination practices (Roche, et. al, 2004). The present study was conducted to indicate the performances of AI in that study area of dairy cattle

To eliminates those severity of problems there are many solution like: good management, vaccines availability within a period, suitable feed intake, eradicating contagious disease. The study has found an alarming result with motivations of the AI technicians in which most of them have indicated that they are not motivated to work as AI technicians due to associated problems and constraints. This is fully supported by the reports of the Field AI Service and Extension Department (2007) that indicated a very high turnover of AI technicians all over the country. The situation is closely associated to the discontinuation of in-service trainings and incentive mechanisms during the past years.

6. CONCLUSION AND RECOMMENDATION

According to the present study the efficiency and effectiveness were more in the study area, especially in Keble 10, but most other study area not as much effective, because of many constraints like unavailability of nitrogen gas and AITs in the left study area.

The present studies indicate that there are many constraints that are expected from the user of AI and the major problems are like: repetitive insemination, lack of feed intake (i, e mostly one kinds of feed), problem of udder (mastitis), deficiency of liquid nitrogen, lack of area, infertility, lack of detection of heat methods, lack of AITs, lack of semen within local area, rewards to motivate AI technicians and the repeat breeding situation was a very alarming finding.

Based on the above finding the following recommendation was forwarded:

- Reduction of feed intake during AI services
- Creating good favorable weather condition
- Improving an availability of feed intake
- Minimizing the effect of disease
- Creating availability of liquid nitrogen
- Availability of heat detection methods and scientific artificial equipment
- Establishment the center of collection semen in the area
- Increasing the number of AITs
- Further study should be conducted on assessment of the fertility levels of herds.
- Establishment of a functional breeding policy and strategy.

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8. APPENDIX
8.1 QUESITIONNAIRE

8.2 socio-economic status of the respondents of the owners

Address: Region_____, Zone ___, Woreda ___, Keble ___ Farmer ID _____

1. As a user of AI, do you get the service regularly and without interruptions? 1. Yes 2. No
2. If your answer is to the above question is no, what is the reason for this?
3. How do you communicate with AI technicians?
4. Do you get AI service on weekends and holidays?
5. Do you have any say in the selection of the type of semen you use?
6. What factors would you use to choose the type of semen given the chance?
7. Are you aware of the problems of inbreeding?
8. Have you faced any animal health problem so far in your dairy herd?
9. If your answer is yes, what problems
10. Do you have easy access to animal health?
11. Are you satisfied with the overall AI service?
12. Do you have any problem in using AI service?
13. How do you evaluate the AI technician in giving you the service?

1. Cooperative 2. Non-cooperatives

14. Do farmers report on time for inseminations?
15. How do you judge the quality of semen you are getting?
16. Do you generally believe that AI is doing well in your area?
17. What do you think are the major problems associated with the AI service in your area?
18. Do you have any idea on how to improve the AI service in the future?
19. What do you think are the major problems/constraints?
20. What are the major problems associated with AI in your area in particular and in the country in general?
21. AI is used more for what? A, dairy b, beef
22. What is the performance of AI?
23. What's a peculiar characteristic that differs from other methods of production?

24. How many calves you have in case is AI?

25. How many of these are males and females?

26. Is any repetitive inseminating problems in your area? And what’s its solution?

8.3 Questionnaire used to collect information from AITs

Address: Region_____, Zone_____, Woreda_____,

Keble____, AIT ID ___

1. What is the performance of AI services?

2. As a professional of AITs, is AI is advantageous for improve cattle production?

3. How do you judge the overall availability of inputs including liquid nitrogen and other consumable?

4. Who does decide the type of semen/bull to be used by you for inseminating?

5. Do farmers report on time for inseminations?

6. Are farmers willing to pay more for the services provided they get reliable and quality services?

7. Do you generally believe that AI is doing well in your area?

8. What is the average number of cows you are covering per day?

9. What do you think are the major problems associated with the AI service in your area?

10. Do you have any idea on how to improve the AI service in the future?

9. DECLARATION

We, the under signed, declared that the information presented here in our senior research project is our original work, has not been presented for degree in any other university and that all sources of materials used for research and report have been duly acknowledged.

Name:

1. MERGA LEMESA Signature———————

2. TARIKU ROBE Signature———————

Date of submission———————————

This thesis has been submitted for examination with my approval as university advisor

Name———————————————

Signature———————————————